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Researchers say popular fish contains potentially dangerous fatty acid combination

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Farm-raised tilapia, one of the most highly consumed fish in America, has very low levels of beneficial omega-3 fatty acids and, perhaps worse, very high levels of omega-6 fatty acids, according to new research from Wake Forest University School of Medicine.

The researchers say the combination could be a potentially dangerous food source for some patients with heart disease, arthritis, asthma and other allergic and auto-immune diseases that are particularly vulnerable to an "exaggerated inflammatory response." Inflammation is known to cause damage to blood vessels, the heart, lung and joint tissues, skin, and the digestive tract.

"In the United States, tilapia has shown the biggest gains in popularity among seafood, and this trend is expected to continue as consumption is projected to increase from 1.5 million tons in 2003 to 2.5 million tons by 2010," write the Wake Forest researchers in an article published this month in the Journal of the American Dietetic Association.

They say their research revealed that farm-raised tilapia, as well as farmed catfish, "have several fatty acid characteristics that would generally be considered by the scientific community as detrimental." Tilapia has higher levels of potentially detrimental long-chain omega-6 fatty acids than 80-percent-lean hamburger, doughnuts and even pork bacon, the article says.

"For individuals who are eating fish as a method to control inflammatory

diseases such as heart disease, it is clear from these numbers that tilapia is not a good choice," the article says. "All other nutritional content aside, the inflammatory potential of hamburger and pork bacon is lower than the average serving of farmed tilapia."

The article notes that the health benefits of omega-3 fatty acids, known scientifically as "long-chain n-3 polyunsaturated fatty acids" (PUFAs), have been well documented. The American Heart Association now recommends that everyone eat at least two servings of fish per week, and that heart patients consume at least 1 gram a day of the two most critical omega-3 fatty acids, known as EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid).

But, the article says, the recommendation by the medical community for people to eat more fish has resulted in consumption of increasing quantities of fish such as tilapia that may do more harm than good, because they contain high levels of omega-6 fatty acids, also called n-6 PUFAs, such as arachidonic acid.

"The ratio of arachidonic acid (AA) to very long-chain n-3 PUFAs (EPA and DHA) in diets of human beings appears to be an important factor that dictates the anti-inflammatory effects of fish oils," the researchers write. They cite numerous studies, including a recent one that predicts "that changes in arachidonic acid to EPA or DHA ratios shift the balance from pro-inflammatory [agents] to protective chemical mediators … which are proposed to play a pivotal role in resolving inflammatory response" in the body.

For their study, the authors obtained a variety of fish from several sources, including seafood distributors that supply restaurants and supermarkets, two South American companies, fish farms in several countries, and supermarkets in four states. All samples were snap-frozen for preservation pending analysis, which was performed with gas

chromatography.

The researchers found that farmed tilapia contained only modest amounts of omega-3 fatty acids – less than half a gram per 100 grams of fish, similar to flounder and swordfish. Farmed salmon and trout, by contrast, had nearly 3 and 4 grams, respectively.

At the same time, the tilapia had much higher amounts of omega-6 acids generally and AA specifically than both salmon and trout. Ratios of long-chain omega-6 to long-chain omega-3, AA to EPA respectively, in tilapia averaged about 11:1, compared to much less than 1:1 (indicating more EPA than AA) in both salmon and trout.

The article notes that "there is a controversy among scientists in this field as to the importance of arachidonic acid or omega-6:omega-3 ratios vs. the concentration of long-chain omega-3 alone with regard to their effects in human biology." Those issues are raised in an editorial in the same issue of the Journal.

The Wake Forest article anticipates that criticism and notes that one human study involving AA showed a probable gene-nutrient connection to coronary heart disease in a specific group of heart disease patients. In another study, four subjects were removed after consumption of high amounts of AA due to concerns about the effect of the acid on their blood platelets.

Floyd H. "Ski" Chilton, Ph.D., professor of physiology and pharmacology and director of the Wake Forest Center for Botanical Lipids, is the senior author of the Journal article. He said that in next month's Journal, he will publish a rebuttal to this month's editorial.

"We have known for three decades that arachidonic acid is the substrate for all pro-inflammatory lipid mediators," Chilton said in an interview.

"The animal studies say unequivocally that if you feed arachidonic acid, the animals show signs of inflammation and get sick.

"A New England Journal of Medicine article three years ago said if you had heart disease and had a certain genetic makeup, and you ate arachidonic acid, the diameter of your coronary artery was smaller, a major risk factor for a heart attack," said Chilton. "My point is that it's likely not worth the risk in this or other vulnerable populations."

Chilton said tilapia is easily farmed using inexpensive corn-based feeds, which contain short chain omega-6s that the fish very efficiently convert to AA and place in their tissues. This ability to feed the fish inexpensive foods, together with their capacity to grow under almost any condition, keeps the market price for the fish so low that it is rapidly becoming a staple in low-income diets.

"We are all familiar with the classical Hippocratic admonition, Primum no nocere, 'First, do no harm.' I think it behooves us to consider this critical directive when making dietary prescriptions for the sake of health," Chilton said.

"Cardiologists are telling their patients to go home and eat fish, and if the patients are poor, they're eating tilapia. And that could translate into a dangerous situation."

Source: Wake Forest University